

# Control benefits and CEO discipline in automatic bankruptcy auctions\*

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## **Abstract**

In Sweden, a bankruptcy filing automatically terminates CEO employment and places the firm in an open auction. This has prompted warnings of strong shareholder risk-shifting incentives to delay filing ("go for broke"). However, during severe distress, equity incentives are weak while CEO incentives to preserve private benefits of control are strong. We show that the CEO may temporarily override risk-shifting incentives, even if she owns a substantial proportion of the firm's equity. Depending on the available investment opportunities, such managerial conservatism may result in firm-value maximizing behavior. Examining Swedish bankruptcies, we find that proxies for CEO control benefits as well as managerial quality are significant determinants of the dramatic CEO wage loss from filing, and of the probability of the CEO being rehired by the buyer in the auction. The expected value of private control benefits increases in the CEO's quality reputation (through the rehiring decision), alleviating to some extent concerns with entrenchment. We also find that firms sold as going concerns generate a post-bankruptcy operating profitability at par with industry rivals.

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# 1 Introduction

Jensen and Meckling (1976) observe that the limited-liability feature of equity provides an incentive for shareholders to substitute low-risk for high-risk projects during financial distress. Since this may result in inefficient project selection, shareholders benefit ex ante from contractual restrictions suppressing their risk-shifting incentives ex post. For example, as in Smith and Warner (1979), debt covenants restricting various forms of asset dispositions (merger, sale-leaseback, collateralization, etc.) serve this function. Also, in some countries, the legal code requires company directors to shift their fiduciary responsibility towards bondholders when approaching bankruptcy.<sup>1</sup> However, given the potentially large shareholder gain from risk-shifting during severe financial distress, as well as the inherent difficulty in verifying such activities ex post, contractual and institutional mechanisms are at best imperfect deterrents.

In this paper, we focus on the risk-shifting incentives of the CEO, not just shareholders. After all, risk-shifting requires the CEO's involvement. In general, the incentives of shareholders and the CEO tend to differ when the CEO's managerial position is at stake. While risk-shifting may be close to a free option for shareholders of a insolvent firm, "going for broke" also increases the chance that the CEO loses her job. If, as we argue in this paper, the CEO derives private benefits from control, she has an incentive to hedge against unfavorable bankruptcy outcomes.<sup>2</sup> These outcomes include outright company liquidation, or reorganization with another CEO at the helm. Our key point is that the existence of private control benefits creates a manager-shareholder conflict of interest during severe financial distress, even if she owns a large equity stake. The reason is that equity incentives are weak (the equity option is out of the money), while incentives to maintain control benefits are strong.

The argument that managers may prefer an investment policy with a more conservative risk-profile than what follows from shareholder preferences is not new. A similar argument is made

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<sup>1</sup>In a number of US states, the board of an insolvent firm owes a direct fiduciary responsibility to creditors [Davis, Jr., McCullough, McNulty, and Schuler (1991)]. Also, creditors receive greater representation on boards of firms in Chapter 11 bankruptcy [Gilson (1990)]. In Sweden, the empirical laboratory of this paper, creditors may reverse pre-filing transactions designed to circumvent the debt priority structure.

<sup>2</sup>We use the term "private benefits of control" (short, "control benefits") to mean any non-contractible managerial benefit from running the firm. Examples such as gaining community prestige, perquisite consumption, and various forms of wealth expropriation are commonly cited in the literature. We also think of managerial ability to hide incompetence and low effort as a potentially important private control benefit.

in the literature discussing incentives to build reputation for managerial quality.<sup>3</sup> However, our focus on control benefits is new, and it makes a contribution also from an empirical point of view. A threat to the CEO’s position places at risk her firm-specific private control benefits. Thus, empirical tests for the presence of incentive effects of private benefits of control are made powerful by conditioning directly on corporate control events.

Our empirical analysis focuses on bankruptcy filings in Sweden, where filing summarily terminates managerial employment contracts and automatically puts the firm up for an open auction. Thus, our setting represents a particularly dramatic control event for the CEO. Upon filing, all debt service is stayed, and a trustee is appointed by the court to run the auction. The trustee normally hires an outside consultant or retains the incumbent CEO on a temporary basis to oversee the firm’s operations until the sale is completed. Bids may be for individual assets (piecemeal liquidation) or for the entire firm as a going concern. Bids must be in cash, and the proceeds are distributed strictly according to absolute priority. The auctions typically attract substantial bidder interest, and the entire process is swift, with an average of 2 months to completion [Thorburn (2000), Eckbo and Thorburn (2001)].

The “hard” constraint on management presented by this automatic auction system has caused some authors to warn of managerial risk-shifting incentives to delay filing [e.g., Aghion, Hart, and Moore (1992), White (1996) and Hart (2000)]. We present three distinct pieces of empirical evidence that tend to undermine this concern. First, we estimate the probability of the CEO being rehired as a function of empirical proxies for managerial quality and private control benefits. Our managerial conservatism hypothesis predicts that private benefits of control will affect the rehiring probability, which it does. In the sample of going concern sales, the greater the CEO control benefits the greater the probability that the CEO is rehired by an inside buyer (a saleback to the manager-owner). This is evidence that control benefits affect the outcome of the auction. We also find that the probability of an outside buyer rehiring the CEO is increasing in her quality reputation. Thus, building a reputation for quality increases the expected value of the CEO’s control benefits. This incentive structure counteracts a potential tendency for private control benefits to induce

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<sup>3</sup>See, e.g., Fama (1980), Harris and Holmström (1981), Holmstrom and Ricart I Costa (1986), and Gibbons and Murphy (1992), Hirshleifer and Thakor (1992) and Zwiebel (1995) for theories of reputation building. The papers by Brander and Poitevin (1992), Hirshleifer and Thakor (1992), and Zwiebel (1995) also argue that managerial compensation contracts, as well as informal labor market discipline, can induce managerial conservatism.

managerial entrenchment.

Second, using tax return information, we document a median CEO income decline around bankruptcy filing. Tax returns reflect income loss from all sources (not just wage decline), including outside compensation from consulting and directorships. We find a median income change of -47% after controlling for the contemporaneous income change of CEOs of non-bankrupt industry rival firms of similar size. Conditional on CEO quality, the income decline increases in CEO control benefits, as predicted. Our evidence of a large ex post settling-up effect in the CEO's wage is consistent with the argument of Fama (1980) that the CEO will tend towards firm-value maximization ex ante. This evidence also complements the literature on CEO compensation changes and turnover in financially distressed firms in the U.S. [e.g., Gilson (1989), Gilson and Vetsuypens (1993), Hotchkiss (1995)].

Third, we look at the post-bankruptcy performance of the auctioned firms. A high-risk strategy of "going for broke" arguably results in a stripped-down firm if it fails. The firm may have lost key employees and there may be few assets left to restructure. Since none of the sample firms are publicly traded, we use operating profitability and bankruptcy refiling rates to indicate the economic health of the firm's operations. The firms sold as going-concerns typically perform at par with their industry rivals. Interestingly, this finding contrasts with the evidence in Hotchkiss (1995) and Alderson and Betker (1999), where public firms emerging from Chapter 11 bankruptcy in the U.S. systematically under-perform their industry peers. We also show that the bankruptcy refiling probability decreases with CEO control benefits and quality, possibly due to pre-filing managerial conservatism. Overall, our performance evidence fail to support the risk-shifting hypothesis.

The rest of the paper is organized as follows. In Section 2, we model CEO investment incentives in the presence of financial distress, and show that control benefits induce managerial conservatism. This section also sets up the paper's main testable hypotheses. Our data sources and sampling procedures are described in Section 3. Section 4 presents our empirical analysis, while Section 5 concludes the paper.

## 2 Auction bankruptcy and managerial discipline

In this section, we model CEO incentives as emanating from a combination of equity ownership, fixed wage, and private benefits of control.<sup>4</sup> We first derive key propositions concerning the CEO's incentive to invest conservatively, and then summarize our main empirical test strategy.

### 2.1 Control benefits and investment incentives

Figure 1 summarizes CEO incentives at various stages of financial distress, ending with bankruptcy auction. The stages are "Pre-distress", "Insolvency", "Bankruptcy filing and automatic auction", and "Auction outcomes". In the pre-distress period, when a control change is unlikely, equity incentives are strong while incentives from control benefits are weak. This follows because the equity call option is in the money,<sup>5</sup> while there is little outside threat to the CEO's position of control. Thus, outside distress, the CEO's incentives are basically aligned with shareholders.

Conditional on insolvency, however, incentives to preserve control benefits may override equity incentives. The equity call option is out of the money, and the incentive effect of a potential control change following bankruptcy filing is large. As listed in Figure 1, the CEO continues to consume control benefits if the company survives bankruptcy as a going concern and if the CEO is rehired. Thus, in contrast to shareholders, the CEO also values the bankruptcy state where the firm is sold as a going concern. Consequently, the CEO may implement a conservative investment strategy to preserve firm survival and hedge her private control benefits. As shown below, the precise condition for managerial conservatism depends on the magnitude of the private control benefits, the expected value of the CEO's equity in the solvency state, and the managerial wage decline due to the negative managerial quality signal implied by a bankruptcy filing.

Suppose the firm is insolvent, and that it owns three assets:  $I$  dollars in cash and access to two investment opportunities  $L$  and  $H$ . The two projects require an initial investment of  $I$  today, and return next period a cash flow in each of three states of  $C \in \{0, c, 2c\}$ . The face value of outstanding debt is  $F > c > I$ , payable in full next period. Project  $L$  is "low risk", and project  $H$

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<sup>4</sup>As discussed in Section 3, below, the CEOs of our sample firms typically own a substantial proportion of the equity (average 56%, median 60%). Moreover, during our sample period, the compensation package of Swedish executives typically consisted of a fixed salary. Executive stock options were not in use (and are still rare for private firms).

<sup>5</sup>The equity of a leveraged firm is equivalent to a call option on the firm's asset, where the strike price equals the face value of total debt that is due for payment.

is “high risk”, with respective probability distributions over the three cash flow states as follows:

$$Pr[C] = \begin{cases} [\pi, 1 - 2\pi, \pi] & \text{for } L \\ [\pi + a, 1 - 2\pi - (a + b), \pi + b] & \text{for } H. \end{cases} \quad (1)$$

Assuming risk neutrality and a discount rate normalized to zero, the value of project  $L$  is positive ( $NPV_L = c - I > 0$ ). However, since  $E(C) = c < F$  the firm is in financial distress.

The firm faces bankruptcy next period in both the low and intermediate states. Suppose that the bankruptcy auction results in piecemeal liquidation of the firm in the low state, and sale as a going concern in the intermediate state. For simplicity, we assume that bankruptcy costs are zero so that the buyer in the competitive auction pays  $c$  in the intermediate state. With  $a > b > 0$ ,  $NPV_L - NPV_H = (a - b)c > 0$ , and the firm-value maximizing (efficient) investment policy is to accept project  $L$ . Let  $S_L$  and  $S_H$  denote the expected payoff to shareholders. With limited liability, shareholders ignore the insolvency states, and  $S_L = \pi(2c - F)$  and  $S_H = (\pi + b)(2c - F)$ . Thus,  $S_H > S_L$ , and shareholders prefer the low-value but riskier project.<sup>6</sup>

The CEO leaves the firm in the low state, stays on in the high state, and is rehired with probability  $\alpha$  in the intermediate state. As long as she remains with the firm, she derives private benefits of control equal to  $\beta$  dollars. Her compensation is also a function of the fraction  $\tau \in [0, 1]$  she owns of the firm’s equity, and of the wage decline  $\gamma$  dollars resulting from the negative reputational signal of a bankruptcy filing. Here,  $\gamma = w_h - w_l$ , where  $w_h$  is her wage in the high (non-bankrupt) state, and  $w_l$  is the wage in either of the two bankruptcy states. Thus, for simplicity, we assume that the labor market views a going concern sale and a piecemeal liquidation as equivalent signals of CEO quality.

With this notation, the expected wealth to the CEO from selecting either project  $H$  or  $L$  is given by

$$E(W) = \begin{cases} w_h l + \pi\gamma + \beta\pi + \alpha\beta(1 - 2\pi) + \tau S_L & \text{for } L \\ w_l + (\pi + b)\gamma + \beta(\pi + b) + \alpha\beta(1 - 2\pi - a - b) + \tau S_H & \text{for } H. \end{cases} \quad (2)$$

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<sup>6</sup>Note that if  $S_L < I$ , shareholders will invest only if legal rules or the firm’s debt contracts prohibit a liquidating dividend of  $I$ . Also, our assumption that  $NPV_L > NPV_H$  is not critical. Project  $H$  could also be a mean-preserving spread of project  $L$  (i.e.  $a = b$  so that the two projects have equal  $NPV$ ) without changing the key results below. Our scenario where  $NPV_L > NPV_H$  highlights the potentially damaging effects of risk-shifting on total firm value.

Assuming the CEO acts to maximize  $E(W)$ , we can now characterize the condition for managerial conservatism as follows:

**Proposition 1:** *With private benefits of control of  $\beta$ , an equity ownership proportion of  $\tau$ , and a wage decline of  $\gamma$  resulting from a bankruptcy filing, the CEO overrides shareholder preferences for the high-risk project  $H$ , and invests in the low-risk project  $L$ , if  $E_L(\beta) - E_L(\gamma) + \tau S_L > E_H(\beta) - E_H(\gamma) + \tau S_H$  or, equivalently, if  $\gamma/\beta < \alpha(a/b + 1) - 1 - \frac{\tau}{\beta}(\frac{S_H}{\pi+b})$ .*

To provide some intuition for this result, consider first the simple case where bankruptcy filing does not affect the CEO's wage and where the CEO owns no equity in the firm ( $\gamma = \tau = 0$ ). This reduces the condition for managerial selection of project  $L$  in Proposition 1 to  $\alpha > b/(a + b)$ . Intuitively, the greater project  $H$ 's "skewness" ( $a/b$ ) in favor of the liquidation state (where the manager is fired for sure), the smaller the value of the rehiring probability  $\alpha$  in the intermediate state that is necessary for the manager to prefer  $L$  over  $H$ .<sup>7</sup>

Adding a wage reduction effect of bankruptcy filing ( $\gamma > 0$ ), the condition in Proposition 1 for selecting the low risk project becomes  $\gamma/\beta < \alpha(a/b + 1) - 1$ . Now, for a given rehiring probability  $\alpha$ , the CEO selects the low-risk project only if the control benefits  $\beta$  are sufficiently large relative to the wage reduction  $\gamma$ . The wage reduction lowers the scope for managerial conservatism since it lowers the CEO's payoff in all the bankrupt states, and thus increases the relative attractiveness of the solvency state.

Finally, the incentive effect of a positive equity stake in the firm ( $\tau > 0$ ) is to increase the CEO payoff in the solvency state, thus tilting the project selection towards the high-risk project  $H$ . In this case, since  $\frac{S_H}{\pi+b} = (2c - F)$  is a constant, a marginal increase in the ownership stake  $\tau$  causes a marginal reduction in the incentive to select the low-risk project that is proportional to the ratio  $\tau/\beta$ . Note that this ratio is always small, as is the value of  $S_H$  since the equity option is out of the money. Thus, equity incentives are low, which means that a CEO may exhibit conservatism even if she owns a large equity stake.

If the CEO acts conservatively and overrides shareholder preferences, will outside investors react negatively? After all, isn't this a manifestation of a breakdown of the agency relationship between

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<sup>7</sup>If project  $H$  is a mean-preserving spread of project  $L$  ( $a = b$ ), then the condition reduces to  $\alpha > 0.5$ . Interestingly, as discussed in the empirical analysis below,  $\alpha \approx 0.5$  in our sample of bankrupt firms.

shareholders and the CEO? Would this make it difficult for the CEO to raise capital going forward? There are two distinct issues here. First, since managerial conservatism may promote efficiency (firm-value maximization), the temporary misalignment of shareholder-manager interests need not be viewed negatively by outside investors, and may even be viewed positively (although not by existing shareholders). CEO conservatism may also be seen as consistent with legal rules governing director fiduciary responsibility during insolvency.

The more difficult question concerns whether the existence of large private benefits of control is tantamount to costly managerial entrenchment in periods outside of distress. This is a relevant question for our typical sample CEO who owns a sufficient amount of equity to control her position in the firm. For example, Stulz (1988) shows that a controlling equity stake can reduce firm value as the insider refuses to tender her shares in a control transaction. We deal with this issue in two ways in our empirical analysis to follow. First, we examine the effect of managerial quality on the CEO rehiring probability, and thus on the expected value of the CEO's control benefits. We posit that a high-quality manager is less likely to be entrenched. If this is true, the expected value of  $\beta$  is also increasing in CEO quality, alleviating concerns with private control benefits promoting entrenchment. Second, we use the CEO's equity ownership proportion  $\tau$  to construct our proxy for CEO control benefits. Since Proposition 1 tells us that a large value of  $\tau$  produces only a small incentive alignment effect in distress, we posit that the main effect of a controlling ownership position for the CEOs in our sample is to enhance private benefits of control.

## 2.2 Empirical test strategy

Absent direct information on pre-bankruptcy project selection, our empirical analysis focuses on (1) the rehiring probability  $\alpha$ , (2) the managerial wage decline  $\gamma$ , and (3) the post-bankruptcy performance of the restructured company. We also separate company salebacks from going-concern sales to outside investors.

**H1 (The rehiring probability):** *(1) The rehiring probability  $\alpha$ , and therefore the expected value of the control benefits  $\beta$ , increases in the CEO's reputation for quality. (2) Holding managerial quality constant, the probability that an external buyer in the bankruptcy auction rehires the CEO decreases in beta. (3) The probability that the CEO*



*will be rehired in a saleback to the old owner-manager increases in  $\beta$ .*

The motivation for the first prediction, that  $E(\beta)$  increases in the manager's quality reputation, is given at the end of the previous section. Second, holding quality constant, external buyers may associate larger control benefits with greater CEO entrenchment, which reduces the probability of the CEO being rehired. Third, in a saleback, private benefits of control plays a dual role. First, the greater the value of  $\beta$ , the greater the price the CEO is willing to bid in a saleback. Thus,  $\beta$  provides a competitive advantage for the CEO over external buyers in the auction.<sup>8</sup> Second, following a successful saleback bid, large control benefits tend to override CEO quality considerations in the rehiring decision.

**H2 (CEO income loss):** *(1) Filing for Bankruptcy on average damages managerial reputation and results in an income loss. (2) The income loss occurs in a saleback as well as when the firm is sold to an external buyer. (3) When the CEO is rehired by an external buyer, the income loss is increasing in the CEO's pre-filing private control benefits  $\beta$ .*

If large private benefits of control signal CEO entrenchment, the outside wage offer is predicted to decrease as  $\beta$  increases. H2 also predicts a wage decline in salebacks. If a saleback signals large private benefits of control and CEO entrenchment, she faces greater financing costs (a hypothesis that we also test). Greater financing costs reduce firm value and thus limit the CEO's flexibility in maintaining a wage above a level implied by her outside opportunities. In the empirical analysis, we use data on all sources of CEO income before and after the bankruptcy, as listed in personal tax returns. Moreover, we benchmark the CEO income decline with the income change of CEO's of rival firms of similar size.

**H3 (Post-bankruptcy firm performance):** *Managerial conservatism, followed by an effective screening on CEO quality, produce a post-bankruptcy firm performance at par with that of non-bankrupt industry rivals.*

This hypothesis contrasts with the predicted effects of classical risk-shifting and delayed-filing arguments. For example, in the U.S., we know that managers of distressed firms often resort to

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<sup>8</sup>See Eckbo and Thorburn (2001) for a comprehensive analysis of bidding strategies in Swedish bankruptcy auctions.

substantial asset sales as a means to raise cash and delay bankruptcy filing.<sup>9</sup> Such asset stripping carries the risk of synergy losses, loss of key employees, and asset fire sales, all of which deplete the firm’s going concern value. Thus, if the asset stripping strategy fails to keep the firm out of bankruptcy, it may be difficult to restructure the firm as a viable going concern. We posit in H3 that managerial restraint (conservatism) in the immediate pre-filing period has the opposite effect. Moreover, a buyer that effectively screens on CEO quality (hires a new outside CEO when the old CEO is of low quality), improves the long-run survival properties of the restructured firm. Absent data on market value of equity for our private firms, we use post-bankruptcy operating performance and bankruptcy refiling rates to gauge the empirical relevance of H3.<sup>10</sup>

### 3 Data sources and sample characteristics

#### 3.1 Data sources

We start by adding information on firm- and CEO characteristics in the sample of 263 Swedish bankruptcy cases originally compiled by Thorburn (2000). The sample, which consists of bankruptcy filings between January 1, 1988 and December 31, 1991, is identified using the proprietary database of UpplysningsCentralen (UC). To be included, the filing firm must have at least 20 employees. There are a total of 1,159 firms in the UC database satisfying the above criteria. Of these, 581 firms are eliminated because the filing was in a remote geographical area,<sup>11</sup> while another 315 cases are excluded for one of the following additional reasons: the case is still pending in bankruptcy as of June 30, 1995 (145 cases);<sup>12</sup> there are tax fraud charges (59 cases); and the bankruptcy file is incomplete (111 cases). Of the 263 cases in the sample, 9 filings occurred in 1988, 27 in 1989,

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<sup>9</sup>See, e.g., John, Lang, and Netter (1992), John and Ofek (1995), Andrade and Kaplan (1999), and DeAngelo, DeAngelo, and Wruck (2002) for evidence of asset dispositions in distress.

<sup>10</sup>The prediction in H3 is subject to a caveat: A skilled restructuring expert may be able to produce a decent post-bankruptcy performance even when the bankrupt firm is severely run down by the old CEO. Thus, evidence of normal post-bankruptcy performance is consistent with both managerial conservatism and skilled restructuring. Absent independent measures of the buyer’s restructuring skills, or the true state of the bankrupt firm’s assets (other than recovery rates), this part of our empirical analysis is therefore exploratory in nature. As such, we join a substantial literature examining post-event accounting performance, including bankruptcy [e.g., Hotchkiss (1995), Hotchkiss and Mooradian (1998), Alderson and Betker (1999)].

<sup>11</sup>The sample is limited to firms located in the four largest provinces in Sweden: Stockholms län, Göteborg- och Bohus län, Malmöhus län and Upplands län. This restriction economizes on the cost of physical travel to each jurisdiction where bankruptcy files are stored.

<sup>12</sup>While the firm’s assets are quickly auctioned off in bankruptcy, the old and empty corporate shell typically remains on file with the court for several years. This is a formality that has no implications for the sale of the firm’s assets in the auction.

71 in 1990, and 156 in 1991. The auction results in 200 firms sold as going concern, 60 piecemeal liquidations, while 3 cases have insufficient information to be classified by outcome. Throughout the paper, a “going-concern sale” is defined as a joint sale of the assets that are essential for the firm’s continued operations. Examples of such assets are inventory, machinery, vehicles, unfinished products, intangible assets, industrial estate and rental contracts.

For each firm in the sample, we add information on firm- and case-specific characteristics identified from the public court record. For 260 firms, the identity of the incumbent CEO is found by matching information in the court records with UC-supplied information on board membership. UC also supplied financial statements from the period 1987-1995 for the entire Swedish population of 16,000 firms with at least 20 employees that were either operating on December 31, 1991 or pending in bankruptcy. We use this information to calculate industry median operating performance and distress measures.

From the UC database, we construct post-bankruptcy financial statements for 158 firms auctioned as a going concern.<sup>13</sup> Moreover, UC provides the individual tax returns for 258 of the sample firms’ CEOs for the years 1988-1991 and 1993-1994.<sup>14</sup> For comparison, tax returns for the period 1988-1994 are also obtained for a randomly selected sample of CEOs of 1,346 non-bankrupt Swedish firms with at least 20 employees.

### 3.2 Sample characteristics

Table 1 lists several key characteristics of the sample firms. All firms are privately held and small, with average sales of \$5.0 million, total assets (*size*) of \$2.4 million, and 43 employees. The small firm size is a general feature of the Swedish economy and not of our sampling procedure. The sample represents over 30 different 2-digit Standard Industrial Classification (SIC) groups. Twenty-nine percent (76) of the firms are in manufacturing industries, while another 13% (33 firms) are in the construction industry. Thirty firms are in the wholesale business, while there are 26 firms (10%) in each of the hotel and restaurant industry, and the transportation industry.

Panel A of Table 1 lists selected financial characteristics for the sample firms. With the exception of the fraction secured debt, the source of this information is the last financial statement

<sup>13</sup>For 42 going-concern sales, we could not identify the firm post-bankruptcy.

<sup>14</sup>Due to limitations in UC’s database, the 1990 and 1991 tax returns could be obtained for only 130 CEOs, and the 1992 tax returns could not be retrieved at all.

reported prior to the bankruptcy filing, which on average dates back 17.5 months (median 16.5 months). As expected, the firms perform poorly prior to bankruptcy with an average operating profitability (EBITDA to total sales) of -1% (median 2%). Industry-adjusted, the operating profitability (*profmarg*) averages -6% with a median of -4%. “Industry-adjusted” means that we are subtracting the contemporaneous median operating profitability of all Swedish firms with at least 20 employees in the same 4-digit industry (SIC) code as the sample firm. The average number of rival firms per industry used in this industry-adjustment is 299 (median 273), with a minimum of 20. Also as expected, filing firms have high leverage ratios: the average ratio of total book debt to total book assets is 92% (median 93%), and the average interest coverage ratio (EBITDA plus interest income divided by interest expense) is -2.3 (median 1.0).

Absent data on the market value of equity for our private firms, we use the fraction secured debt (*secured*) as a proxy for the proportion tangible assets. The fraction secured debt, which averages 39%, is identified from the bankruptcy file.<sup>15</sup> Thorburn (2000) shows that the greater the proportion secured debt, the higher the probability of piecemeal liquidation. Eckbo and Thorburn (2001) also documents that auction premiums in excess of the piecemeal liquidation value of assets tend to be significantly lower the greater the fraction of secured debt. Both of these two observations are consistent with greater secured debt being a proxy for lower going-concern value, which is what we want.

Panel B of Table 1 lists personal characteristics of the CEO. As indicated by the variable *tenure*, 65% of the filing CEOs have been employed as CEO for at least two years. In other words, over the two-year period prior to filing, 35% of the CEOs are replaced. The firms exhibit concentrated share ownership, with a single shareholder typically controlling 50% or more of the equity. This controlling shareholder is often the CEO herself. As shown in the table, the average CEO equity ownership (*ownership*) is 57%, with a median of 60%.<sup>16</sup> Furthermore, as shown in Figure 2, the distribution of *ownership* is skewed with 88 (43%) CEOs owning 100% of the firm’s shares. Moreover, the CEOs of 50 firms (25%) own no equity, with a fairly even distribution between 0% and 100%. The typical CEO is 20 years from retirement at the time of filing, with an average

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<sup>15</sup>The debt structure of our Swedish companies is typically simple: approximately 90% of the secured debt is bank-debt, there are no firms with public debt, and basically all non-secured claims have identical priority (with the exception of wages and taxes).

<sup>16</sup>We have information on CEO ownership for 205 of the 263 firms. Our CEO ownership data includes the ownership of the CEO’s spouse with the same last name. As it turns out, such non-CEO family ownership is negligible.

age (*age*) of 45 (median 46). Finally, based on the income tax return two years prior to filing, the average CEO total income before tax is \$40 thousand.<sup>17</sup> Thus, given the equity ownership information above, the typical CEO's wealth exposure to the equity value of the firm is substantial.

Panel C provides information on auction characteristics. Upon filing, the trustee is required to provide an estimate of when the firm became insolvent and could potentially have filed for bankruptcy. The variable *delay*, which is the number of months between this first insolvency date and the bankruptcy filing date, averages 4.8 months (median 4.0 months). That is, in the opinion of the trustee, the typical filing firm delayed filing by only 4 months. As discussed further below, this relatively short delay undermines the notion of substantial risk shifting and asset stripping activities following severe financial distress in the filing firms.<sup>18</sup>

Interestingly, the trustee is required to provide an assessment of the reason for the bankruptcy filing. As shown in the table, the trustee concludes in 32% of the cases that the filing is a result of CEO incompetence or economic crime (*inept*). Below, we use this important information, together with the variables *delay*, operating profitability, and debt recovery rate, to construct an empirical proxy for CEO reputation. The debt recovery rate in percent of the face value of total debt (*recovery*) averages 35% (median 33%).

Finally, Panel D reports the degree of industry distress at the time of the sample bankruptcy filings (*distress*). Industry distress is defined as the fraction of firms in the 4-digit industry of the filing firm that have an interest coverage ratio of less than one in the year of the filing or file for bankruptcy the following year. With this definition, on average 42% of firms in the industry are distressed (median 38%). Thus, the typical firm in our sample files for bankruptcy at a time when a substantial number of its competitors are also financially distressed.

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<sup>17</sup>This exceeds the average per capita income in Sweden during the sample period, which is predominantly from 1988-1989. The sample maximum CEO income is \$720 thousand.

<sup>18</sup>Most firms in our sample file for bankruptcy after running out of liquidity and defaulting on their debt payments. In excess of 90% of the filings are made by the firm's management, with the remaining filed by a creditor.

## 4 Empirical Analysis

### 4.1 Factor representation of CEO quality and private control benefits

Tests of the predictions in H1 - H3 requires empirical proxies for CEO quality, which we denote *quality*, and private control benefits, denoted *control*. The typical approach is to include as explanatory variables in a multivariate regression framework a number of individual, observable characteristics that are believed to reflect quality and control aspects. Unfortunately, this approach requires interpretation of a large number of individual regression coefficients of typically correlated characteristics, rendering interpretation difficult.<sup>19</sup>

Below, we instead implement a factor-analytic approach to summarizing the information in the characteristics. The construction of the factors goes as follows: First, we designate key characteristics in Table 1 as determinants of either *quality* or *control*. Second, using generally available empirical evidence, as well as our own economic intuition, we determine *a priori* the coefficient on each characteristic to be either “1” or “-1”. Third, we create a value for each of the two factors by summing the characteristics. When necessary, a characteristic is transformed to fall in the range  $[0, 1]$  so that all characteristics have a commensurable impact on the sum. We then use the factors themselves as regressors in tests of hypotheses H1 - H3.

The factor *control* is constructed using the following characteristics:

$$control = ownership + tenure - secured - n(size), \quad (3)$$

where the variables are defined as in Table 1. The transformation  $n(size)$  is the logarithm of *size* standardized by subtracting the mean and dividing by its standard deviation. Motivated by the discussion at the end of section 2.1 above, and the literature on turnover and corporate control, we constrain the characteristics *ownership* and *tenure* to enter with positive sign. The idea is that the greater the ownership fraction and the longer the CEO’s tenure, the greater the opportunity to extract private benefits.<sup>20</sup> Moreover, we follow the motivation in Dyck and Zingales (2001) and

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<sup>19</sup>We pursued this approach in an earlier version of this paper. The results are available upon request.

<sup>20</sup>Outside periods of distress and bankruptcy, the market value of *ownership* can be reinvested in another firm and produce private control benefits there as well. If so, the ownership stake does not deter risk-taking. However, since our firms are in severe financial distress, the equity value is close to zero and the ownership proportion effectively non-transferable. Moreover, Proposition 1 above shows that the incentive effect of the CEO’s equity value is also low. Thus, we presume that *ownership* increases private control benefits in the construction of the factor *control*.

constrain managerial control benefits to decrease in asset tangibility (*secured*). The characteristic  $n(\textit{size})$  is constrained to have a negative sign as we believe that the smaller the firm, the more diverse the corporate responsibilities carried by the CEO (the less CEO specialization), and the greater the scope for extracting private control benefits.<sup>21</sup>

The factor *quality* is constructed using characteristics available to the buyer in the auction, as follows:

$$\textit{quality} = \sqrt{\textit{recovery}} + \textit{profmarg} - \textit{inept} - \sqrt{\textit{delay}}/\sigma, \quad (4)$$

where, again, all variables are defined as in Table 1, and  $\sigma$  is the standard deviation of the variable. We require *recovery* and *profmarg* to enter with a positive sign, believing that greater values for these characteristics in practice translate into greater CEO reputation. For example, several empirical studies report that the likelihood of CEO turnover decreases in firm performance.<sup>22</sup> Moreover, *inept* and *delay* are constrained to enter with negative sign. We select a negative sign for *delay* because our model emphasizes the importance of firm survival to sustain private control benefits. Presumably, the longer the delay, the lower the chance of firm survival.

## 4.2 The CEO rehiring probability

Of the 200 sample firms sold as going concerns, 166 could be classified as to whether the CEO was rehired. Of these, 80 CEOs (48%) are rehired. Adding the 63 piecemeal liquidations (where the CEO necessarily leaves the firm), the overall percentage of the filing CEOs that are rehired is 37%.<sup>23</sup>

We specify the rehiring probability  $\alpha$  as a function the two factors *quality*, *control*, and the two variables *age* and *distress*. As defined in Table 1, *distress* is the degree of industry-wide financial distress.<sup>24</sup> The variable *age* controls for the CEO's age at filing. Controlling for CEO quality

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<sup>21</sup>Barclay and Holderness (1989), Lease, McConnell, and Mikkelsen (1983), Zingales (1994), and Eckbo and Verma (1994) examine the impact of control benefits based on the market value of control-blocks, stocks with differential voting rights, and voting games. This type of information is not available for our private Swedish sample firms.

<sup>22</sup>It has been suggested to us that the variable *recovery* may also be a measure of how distressed the firm is, and not just a measure of CEO quality. What we need for *quality* to work as a factor in our tests, is that buyers in the auction perceive CEO quality to be correlated with firm value. Our finding below, that the probability of the CEO being hired increases with *quality* supports this presumption.

<sup>23</sup>For comparison with top manager turnover ratios reported for large firms in Chapter 11, see, e.g., Gilson (1989), Gilson and Vetsuypens (1993), and Hotchkiss (1995). Overall, top manager turnover appears to be higher in our Swedish, small-firm auction system than following Chapter 11 filings in the U.S..

<sup>24</sup>Empirically, the factors *control* and *quality* are largely uncorrelated, and uncorrelated with the industry distress variable *distress*. One explanation for this is that the median industry performance has already been purged from

and control benefits, the probability of rehiring is expected to be lower the closer the CEO is to retirement age. The key empirical predictions are now as follows:

$$\alpha = f(\textit{control}, \textit{quality}, \textit{age}, \textit{distress}) \quad (5)$$

$$\frac{\partial \alpha}{\partial \textit{control}} > 0, \quad \frac{\partial \alpha}{\partial \textit{quality}} > 0, \quad \frac{\partial \alpha}{\partial \textit{age}} < 0, \quad \frac{\partial \alpha}{\partial \textit{distress}} < 0.$$

The full set of regressors and coefficient values resulting from the probit estimation is shown in Table 2. The estimation is performed using two samples for which we have sufficient information on all the variables. The first is 112 going-concern sales and the second adds 38 piecemeal liquidations for a total of 150 cases. We report two models. Model 1 uses the four explanatory variables in Eq. (5). Model 2 classifies the factors *quality* and *control* in going-concern sales according to whether the buyer in the auction is the old owner (*saleback*) or a company outsider (*external*), and it includes an interaction variable for piecemeal liquidations (where no one is rehired).

The models in Table 2 have significant explanatory power, with pseudo- $R^2$  ranging from 8% (model 1) to 30% (model 2). Several of the coefficient estimates are as predicted by H1. First, the coefficient for *control* is positive and significant (model 1). Second, model 2 shows that the positive effect of *control* is restricted to salebacks, indicating that the incentive of manager-owners to repurchase the company is increasing in managerial control benefits. H1 also predicts that outside buyers associate large control benefits with managerial entrenchment, which lowers their incentive to rehire the CEO. Given the insignificant coefficient on *control \* external*, this effect is not present in our data. Notice also the significantly negative coefficient on *control \* piecemeal*. In other words, managerial control benefits are on average lower when the firm ends up being liquidated. A consistent explanation is that lower control benefits reduces demand from the old manager-owner to repurchase the company as a going concern.

The variable *quality* is positive and significant at the 2% level or better in model 1, indicating that the buyers in the auction screen the old CEOs on quality before making the rehiring decision. As shown when using model 2, the significance of *quality* reflects screening by the *external* (out-

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*profmargin*. Moreover, regressions of *recovery* on industry distress variables yield insignificant coefficients [Thorburn (2000)]. The variables in *control* (ownership proportion, CEO tenure, secured debt, and firm size) also are not correlated with industry distress. Thus, including *control*, *quality* and *distress* on the right-hand side of the same regression does not induce multicollinearity.



side) buyer, while managerial quality is insignificant in a *saleback* to the old owner-manager. This indicates that screening on CEO quality, while important to the outside buyer, is of secondary importance for an owner-manager, perhaps because she repurchases the company in order to preserve control benefits.<sup>25</sup>

Moreover, the coefficient on *quality \* piecemeal* is insignificant. Since the CEO is never rehired when the firm is liquidated, this suggests that the average CEO quality in firms that are liquidated is indistinguishable from the overall sample mean quality (conditional on model 2). In other words, we cannot conclude that firms end up being liquidated (as opposed to purchased as going concerns) due to poor managerial quality. As discussed in Maksimovic and Phillips (1998), bankrupt firms divest their plants as a function of industry conditions. In our context, if bankruptcy is the result of declining product market demand, a decision to liquidate may very well be taken independently of CEO quality.

The industry distress variable, *distress*, receives a negative coefficient that is significant at the 7% level or better in all four model specifications. As argued above, industry distress possibly lowers demand from industry insiders in the auction, increasing the chance that the firm will be purchased by an industry outsider or liquidated. The lower demand possibly reflects lower CEO incentives to maintain control when the overall industry outlook is depressed. Finally, the variable *age* is insignificant. This may be a reflection of the relatively young age of the CEOs in our sample (mean 45). Replacing *age* with a dummy variable for age 59 or older also produces an insignificant coefficient. Thus, although we would expect CEOs close to retirement age to leave the firm voluntarily following bankruptcy filing, this effect does not influence our coefficient estimates.<sup>26</sup>

While this is the first study of CEO turnover in automatic bankruptcy auctions, several U.S. studies provide evidence that variables such as profitability, managerial equity ownership, and firm size help determine CEO turnover in various other settings. For example, turnover is typically found to be increasing in firm size and decreasing in managerial equity ownership, which supports

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<sup>25</sup>Since the old owner-manager knows her own *true* managerial quality, an alternative interpretation of the insignificant coefficient on *quality \* saleback* is that our empirical proxy for quality is simply coarser than the CEO's own information.

<sup>26</sup>As argued by Brickley, Linck, and Coles (1999), the labor market time horizon of CEOs may very well extend beyond formal retirement age. They find that greater CEO reputation (measured using firm performance) increases the likelihood of future board directorships. The lack of significance of our variable *age* for turnover contrasts with the finding on U.S. data reported by, e.g., Weisbach (1988), Murphy and Zimmerman (1993), Mikkelsen and Partch (1997), and Goyal and Park (2002).

our use of a positive sign for *ownership* and negative sign for  $n(size)$  in the construction of the factor *control* in Eq. (3).<sup>27</sup> Moreover, operating performance is often found to be negatively related to CEO turnover, which supports the use of a positive sign for this variable in the construction of *quality* in Eq. (4).<sup>28</sup> In sum, the results in Table 2 provide support for the key prediction of **H1**: the CEO rehiring probability  $\alpha$  increases with private benefits of control in salebacks. In addition, the rehiring probability increases with outside reputation for quality, and decreases with industry-wide distress.

We now turn to an investigation of the effect of bankruptcy filing on total CEO income, as discussed in H2.

### 4.3 The CEO income loss

In the model of section 2, the parameter  $\gamma$  represents the CEO's wage reduction from bankruptcy filing. Hypothesis H2 is, however, stated more broadly in terms of the CEO income loss from all sources. This is because a loss of reputation may affect the CEO's outside income as well, including outside fees from consultancy, board memberships, etc.. This information is provided by the individual tax returns for a total of 258 of our sample CEOs. Importantly, the tax returns allow us to follow the CEO's income also *after* she leaves the company, and we focus on the time series of income change over the event period year  $-3$  through year 5, where year zero is the year of the bankruptcy filing.

We measure the rate of income change in two ways. The first uses data on the filing CEOs only, and is computed as  $\Delta c_t = (c_t - c_{t-1})/c_{t-1}$ , where  $c_t$  is a CEO's net income before tax in year  $t$ .<sup>29</sup> The second is the "abnormal" CEO's income change, measured relative to the contemporaneous CEO income change  $\Delta d_t$  in a matched non-bankrupt firm of similar total asset size and in the same 4-digit SIC industry. The abnormal CEO income change is defined as  $\Delta c_t^* = \Delta c_t - \Delta d_t$ . The control firms are selected from the random population of 1,346 non-bankrupt firms described at the end of section 3.1, above.

<sup>27</sup>See, e.g., Warner, Watts, and Wruck (1988), Gilson (1989), Ofek (1993), Denis and Denis (1994), Denis, Denis, and Sarin (1997), Mikkelsen and Partch (1997).

<sup>28</sup>See, e.g., Warner, Watts, and Wruck (1988), Weisbach (1988), Morck, Shleifer, and Vishny (1989), and Mikkelsen and Partch (1997).

<sup>29</sup>Since capital losses are not deductible against salary income in Sweden,  $\Delta c_t$  reflects the full salary loss of the CEO.

Figure 3 provides a visual impression of the significant income difference that develops between filing and non-filing CEO as of the year of bankruptcy filing. The figure plots an index of the annual taxable CEO income before taxes, denoted  $\hat{c}_t$ . The index value is normalized to 100 in year -3, and is computed as  $\hat{c}_t = \hat{c}_{t-1}\Delta c_t^m$  for subsequent years, where  $\Delta c_t^m$  is the sample median of  $\Delta c_t$ . The index value for non-filing CEOs is computed the same way, with  $d$  replacing  $c$  everywhere. The top curve in the graph is the index value for the control sample of non-bankrupt firms, while the lower curve is the index value for the CEOs of bankrupt firms. As shown, the incomes of filing and non-filing CEOs grow at approximately the same rate up until bankruptcy filing. Then, over the subsequent three years (year 0 through year 2), filing CEOs show a sharp income decline while non-filing CEOs' income continue to grow at about the same rate as before. After year 2, the incomes of the two categories of CEOs again grow at the same rate. In other words, it appears that bankruptcy filing produces a large and *permanent* income loss for the filing CEO relative to the top management of non-filing industry competitors.

From the inspection of Figure 3, it is natural to focus on the event period from year -2 through year 3 as capturing the full income change differential between filing and non-filing CEOs. The median and mean values of the abnormal income change  $\Delta c_{-2,3} - \Delta d_{-2,3}$  are -47.0% and -66.1%, respectively. Using a nonparametric sign test for the median, and a t-test for the mean, both numbers are significantly different from zero on a 1% level. As predicted, bankruptcy induces a statistically significant income loss for CEOs of filing firms, relative to the contemporaneous income change of CEOs of matched, non-bankrupt companies.

Next, we estimate a cross-sectional regression model for the income change  $\gamma \equiv \Delta c_{-2,3}$ . Since H2 predicts that  $\gamma$  depends on CEO control benefits, we use the same regression specification as for the rehiring model (Eq. 5 and Table 2):

$$\begin{aligned} \gamma &= f(\text{control}, \text{quality}, \text{age}, \text{distress}) \\ \frac{\partial \gamma}{\partial \text{control}} &> 0, \quad \frac{\partial \gamma}{\partial \text{quality}} < 0, \quad \frac{\partial \gamma}{\partial \text{age}} > 0, \quad \frac{\partial \gamma}{\partial \text{distress}} > 0. \end{aligned} \tag{6}$$

The results are in Table 3. Due to data constraints on primarily the income variable, the regression employs a total of 114 cases; 85 going-concern sales and 29 liquidations. The regression models have low explanatory power, with adjusted  $R^2$  for model 2 of 4% and 6%, respectively. With the

exception of *control*, the regressors receive statistically insignificant coefficients. Thus, the income decline, while large and significant on average, does not depend on CEO quality, CEO age, or industry distress.

The coefficient on *control* is positive and significant for the sample of going-concern sales (model 1), with a p-value of 8%. Thus, greater control benefits lowers the CEO’s wage upon bankruptcy filing, possibly because high control benefits are associated with greater CEO entrenchment. This interpretation is reinforced by the significance of *control\*external* (p-values of less than 2%). That is, the CEO income decline is greater when the firm is purchased by a company *outsider* and the CEO enjoys large control benefits, as predicted by H2.

H2 also predicts that the CEO wage decline should occur for salebacks as well as for sales to outsiders. The median, industry-adjusted wage decline ( $\Delta c_{-2,3}^*$ ) is -25% for salebacks and -57% for sales to company outsiders, with the difference being statistically insignificant. Thus, retaining control through a saleback does not hedge against a CEO income decline. As discussed in Section 2.2 above, a possible reason for this wage decline is that the saleback firm is relatively cash constrained due to higher cost of external (debt) financing given the potentially greater CEO entrenchment in salebacks. If so, the greater cost of debt constrains the CEO’s ability to maintain her wage at the pre-bankruptcy level, despite being a controlling owner-manager following the saleback. To examine this possibility, we compare the cost of debt across salebacks and sales to outsiders over the year following the auction. The ratio of interest expense to the face value of total debt averages 7.4% for salebacks and 5.3% for sales to outsiders, the difference being statistically significant at a 5% level (two-tailed Wilcoxon signed-rank test). The source of this greater cost of debt is not due to a greater leverage of salebacks: for year one, the median leverage ratio (book total debt over book assets) is 0.90 for salebacks and 0.91 for non-salebacks.

To our knowledge, this study is the first to document compensation changes of individual CEOs *after* they leave the firm. Gilson and Vetsuypens (1993) compare the compensation given old and new CEOs following distressed restructurings and Chapter 11 bankruptcy. They report that if the CEO is replaced by an outsider, the median new CEO receives a cash compensation (salary and bonus) that is 36% higher than her predecessor, indicating a substantial wage differential to a CEO “untainted” by bankruptcy and distress. Moreover, if the CEO is replaced by an insider with ties to the previous management, the new CEO receives on average 35% *lower* cash compensation than

the outgoing CEO. Thus, it appears that CEOs involved in distressed reorganizations experience significant compensation declines in both Sweden and the U.S..

#### 4.4 Post-bankruptcy performance

In this section, we report post-bankruptcy operating performance, leverage ratios, and bankruptcy refiling probabilities. This information helps gauge the likelihood that the firm is severely and irreversibly “run down” by pre-filing risk-shifting and asset stripping, and whether the automatic auction process itself efficiently restructures the firm. As predicted by H3, evidence that the bankrupt firms tend to perform at par with their industry rivals supports the joint hypothesis of managerial conservatism *ex ante* and effective screening of CEO’s by the buyer in the auction.

Post-bankruptcy performance estimation requires identification of the new restructured firm. Using information from the bankruptcy file and UC, a total of 158 of the going-concern sales could be identified post-bankruptcy. Of these, post-bankruptcy financial statements are available for 115 firms. Table 4 lists five performance and growth measures, adjusted for industry median, for this sample. The five measures are: annual operating profitability (EBITDA/sales), sales growth, growth in total (book value) assets, the ratio of capital expenditure to total assets,<sup>30</sup> and book value of total debt to total assets. The table reports median values with and without an adjustment for the industry median. The industry-adjusted value is the *median* of the difference between the firm and its median industry rival, where a rival is a firm with at least 20 employees in the same 4-digit SIC industry as the bankrupt company.

Using a Wilcoxon signed-rank test, the median industry-adjusted operating profitability is indistinguishable from zero at a 5% level in each of the five years following bankruptcy, as predicted by H3. Computing operating profitability using total assets instead of sales produces identical inferences. By year 5, 63% of the surviving sample firms perform better than the median industry benchmark firm. Moreover, the growth rates in sales and assets are at par with the respective industry medians.<sup>31</sup>

The level of capital expenditures is significantly above the industry median in year 2 (the first

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<sup>30</sup>Capital expenditure is the change in property, plant, and equipment from last year plus the current year’s depreciation.

<sup>31</sup>As there is no financial statement for the restructured firm in year 0 (the auction), the growth rates start in year 1.

year of measurement) and converges to the industry level by year 3. Also, the auctioned firms emerge more highly leveraged than their industry rivals (median debt/assets of 0.90 vs. 0.80 in year 1) and they tend to stay highly leveraged through year 4.<sup>32</sup> Overall, the information in Table 4 indicates that firms emerging as going concerns from auction bankruptcy are more highly levered but perform, grow and invest at the level of their industry rivals.

Next, we ask whether the industry-adjusted operating profitability  $\pi_t$  cumulated over years  $t = 1$  and  $t = 2$  are affected by our quality and control factors, using the following regression model:

$$e^{\sum_1^t \pi_t} = f(\text{control}, \text{quality}, \text{distress}, \text{merger}), \quad t = 1, 2, \quad (7)$$

$$\frac{\partial e^{\sum_1^t \pi_t}}{\partial \text{control}} > 0, \quad \frac{\partial e^{\sum_1^t \pi_t}}{\partial \text{quality}} > 0, \quad \frac{\partial e^{\sum_1^t \pi_t}}{\partial \text{distress}} < 0, \quad \frac{\partial e^{\sum_1^t \pi_t}}{\partial \text{merger}} > 0.$$

Here, *merger* is a dummy variable indicating that the buyer in the auction merged the bankrupt firm into another going concern (and not into an empty corporate shell).<sup>33</sup> The variable *merger* controls for possible synergy effects of the acquiror's existing assets. We focus on years 1 and 2 only, as the impact of the pre-filing characteristics in *control* and *quality* on the subsequent performance of the restructured firm are greatest in the early years.

We use Eq. (7) to investigate whether the cross-sectional variation in the old CEOs control benefits and quality help explain the auctioned firms' industry-adjusted operating profitability. Under H3, high-quality managers with high control-benefits exhibit conservatism in their pre-bankruptcy choices. Coupled with effective screening by the (external) buyer in the auction, the presumption is that this conservatism makes it easier to restructure the firm and run it in a profitable manner post-bankruptcy. Thus, it follows from H3 that the industry-adjusted operating performance is increasing in *control* and *quality*.

The results are in Table 5. Due to data constraints on post-bankruptcy financial statements, the regression employs a total of 66 going-concern sales. The adjusted  $R^2$  ranges from 4% (model 1) and 10% (model 2), respectively. The factor *control* is insignificant in all four models. However,

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<sup>32</sup>While not shown in Table 4, the relatively high debt level is also reflected in a lower-than-industry interest coverage ratio. Studying firms emerging from Chapter 11, Gilson (1997) also finds that debt levels remain high.

<sup>33</sup>Approximately one-third of the going-concern sales were merged into an existing going concern.

*quality* receives a significantly positive coefficient in year 1 (model 1), which is consistent with H3. Model 2 in year 1 shows that the significance of *quality* is greatest in the sample of salebacks. This result is intuitive since, in our framework (and supported by the results in Table 2), there is more extensive screening of CEO quality when the buyer is external. Effective screening tends to eliminate the correlation between *quality* (measured using the pre-bankruptcy CEOs) and subsequent post-bankruptcy performance. The cumulative performance over years 1 and 2 is also increasing in the variable is *merger*. That is, merging the bankrupt firm with the buyer’s assets appears to improve the subsequent two-year industry-adjusted operating performance.

Finally, we examine our second measure of post-bankruptcy performance: the likelihood that the restructured firm is forced to refile for bankruptcy. Again, pre-bankruptcy managerial conservatism coupled with effective CEO quality screening, are predicted to increase survival, i.e., reduce the refiling probability. In our sample of 158 identified post-bankruptcy firms, a total of 39 (25%) refile for bankruptcy within two years, and 59 (37%) within five years. The median time to refiling is 20 months (average 23). These refiling rates are higher than the 19% five-year filing frequency for the overall population of Swedish firms with 20 employees or more over the same time period.<sup>34</sup> Table 6 estimates, using the explanatory variables in Eq. (7), the probability of refiling for 94 going-concern sales over 1, 2, and 3 years following bankruptcy.<sup>35</sup> The probit regressions are significant for years 2 and 3 (Chi-square test) with values of the pseudo- $R^2$  ranging from 9% (model 1) to 13% (model 2). The insignificance of the year-1 regression is not surprising given the proximity to the auction itself (recall that the median refiling firm files in 20 months).

Focusing on the year-2 regression (the results are similar for year 3), greater values for both *control* and *quality* lowers the probability of refiling. The significance of *control* in model 2, year 2, is predominantly driven by the subsample of external buyers. As discussed above, external buyers have a greater incentive to screen on CEO quality, which by itself improves post-bankruptcy performance. The significance of *control \* external* further implies that, within the sample of external buyers, the greater the private benefits of control, the lower the chance of refiling. This is consistent with H3 where greater control benefits leads to greater pre-bankruptcy managerial

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<sup>34</sup>The source of the general filing rate is Statistics Sweden. Our sample period covers a severe business downturn in the fall of 1991, causing the annual bankruptcy filing rate for firms with at least 20 employees in Sweden to peak at 6% in 1992.

<sup>35</sup>The sample size is up from 66 in Table 5 as the regressions in Table 6 do not require post-bankruptcy financial statements. We also ran the estimation for years 4 and 5, with similar results.

conservatism, which in turn improves the firm’s chance of long-term survival. Also, as with the earlier regression on operating performance, the significance of *quality* is driven by the subsample of salebacks. The intuition for this result is identical to the one given above for Table 5: there is more extensive screening of CEO quality when the buyer is external, eliminating the correlation between *quality* and subsequent post-bankruptcy performance.<sup>36</sup>

Overall, the evidence in tables 4-6 is interesting. The typical restructured firm performs at par with its industry rivals. The operating performance increases in *quality*, while the refiling probability is decreasing in both *quality* and *control*. These findings are consistent with the joint hypothesis of managerial conservatism ex ante and efficient screening on CEO quality in the auction (H3). The evidence provide little support for the alternative view that the auction bankruptcy system induces costly risk-shifting and asset stripping activities to avoid bankruptcy.

In contrast to our findings for Swedish small-firm bankruptcies, Hotchkiss (1995) reports that a sample of 197 public firms emerging from Chapter 11 significantly underperform industry rivals over a five-year post-bankruptcy period. Moreover, operating profitability suffers—and bankruptcy refiling probability is increased—when the reorganized firm retains the old management.<sup>37</sup> She concludes that there is little evidence that the Chapter 11 process effectively rehabilitates distressed firms.

## 5 Conclusions

We present a simple model demonstrating that CEO private benefits of control complement managerial reputation, compensation schemes, and financial contracts in counteracting costly shareholder risk-shifting incentives during financial distress. The implied managerial conservatism in project selection attenuates agency costs of debt and benefits shareholders ex ante. We take this model to a sample of bankruptcy filings in Sweden, where a filing summarily terminates managerial employment contracts and automatically puts the firm up for auction. The “hard” constraint on management makes this an ideal laboratory for examining the opposing theories of risk-shifting and managerial conservatism prior to filing. While we do not have data on specific pre-filing project

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<sup>36</sup>As shown in an earlier version of the paper, the refiling probability does not depend on whether the auctioned firm is run by the old CEO or an outsider.

<sup>37</sup>In her sample, 32% of the firms refile for bankruptcy or initiates a private debt workout within five years.



choices or asset substitutions, the theory predicts that managerial concern with maintaining private benefits of control will manifest itself in the buyer's decision to rehire the CEO, the CEO income loss from filing, and the post-bankruptcy performance of the restructured firm.

Our empirical analysis employs two factors representing private benefits of control and CEO reputation (quality). The factors, which are constructed using a set of characteristics that are observable to the buyer in the bankruptcy auction, turn out to significantly determine the CEO rehiring probability, as predicted. Greater levels of control benefits increase the probability of a saleback of the firm to the old manager-owner (where the CEO essentially rehires herself). Moreover, we find that the probability that an external buyer will rehire the manager increases with the manager's quality reputation. Thus, the greater the managerial quality, the greater the expected value of her private control benefits. This incentive structure tends to alleviate concerns that private control benefits also promote managerial entrenchment.

Using personal tax returns (publicly available in Sweden), we are able to track the CEO's income also *after* she leaves the firm. We find that a bankruptcy filing is a costly event: the median CEO income change around bankruptcy is -47% in *excess* of the contemporaneous income change for a control sample of CEOs of non-bankrupt firms matched on industry and firm size. The income loss of a filing CEO does not depend on whether the CEO stays or leaves the firm, and it does not vary with our CEO quality factor. Thus, it does not appear that high-quality CEOs avoid the wrath of the labor market following bankruptcy filing. Conditional of CEO quality, the CEO income loss increases with the factor measuring private benefits of control provided the buyer is a company outsider. Thus, outside buyers tend to screen CEOs using estimates of both CEO quality and private control benefit.

We also find that the firms emerging from the bankruptcy auction perform well. Post-bankruptcy operating profitability is at par with (healthy) industry rivals in every year over a five-year period following the auction. The firms show healthy growth rates in sales and total assets, and capital expenditures are at par or above that of rival firms. We also find that the post-bankruptcy operating performance increases in our CEO quality factor. Greater control benefits and CEO quality reduces the probability that the firm will refile for bankruptcy over the years following the initial filing, suggesting reduced pre-filing risk-shifting.

Overall, our results indicate that a bankruptcy filing in the Swedish automatic auction system is

costly for the filing CEO, and that the probability of the CEO maintaining her position depends on publicly available information about her control benefits and quality. We conclude that the ex ante incentive effects of the instant labor market transaction (upon filing) help explain why the firms emerging from the bankruptcy auctions as going concerns are economically healthy. There is no empirical support for the alternative hypothesis that CEOs systematically run down distressed firms by means of costly risk-shifting and asset stripping strategies in order to stay out of bankruptcy.

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**Table 1****Pre-filing and auction characteristics for Swedish firms filing for bankruptcy, 1988-1991.**

The table shows characteristics for 263 privately held firms filing for auction bankruptcy in Sweden, 1988-1991.

Characteristic	Variable name	Mean	Median	Standard deviation
<b>A: Pre-filing firm characteristics<sup>1</sup></b>				
Sales in \$ million		5.0	2.7	7.3
Book-value of assets in \$ million	<i>size</i>	2.4	1.3	3.6
Number of employees		43	29	48.3
Operating profitability <sup>2</sup>		-0.01	0.02	0.14
Industry-adjusted operating profitability <sup>3</sup>	<i>profmarg</i>	-0.06	-0.04	0.14
Debt-to-assets ratio <sup>4</sup>		0.92	0.93	0.21
Interest-coverage ratio <sup>5</sup>		-2.32	1.02	35.4
Proportion secured debt of total debt	<i>secured</i>	0.39	0.38	0.25
<b>B: CEO characteristics</b>				
CEOs tenure exceeds two years (dummy) <sup>6</sup>	<i>tenure</i>	0.65	-	-
Fraction CEO equity ownership in the filing firm <sup>7</sup>	<i>ownership</i>	0.57	0.60	0.43
CEO age at filing	<i>age</i>	45.1	46.0	7.3
Pre-filing income in \$ thousand <sup>8</sup>		39.7	26.0	73.9
<b>C: Auction characteristics</b>				
Delay from insolvency to filing in months <sup>9</sup>	<i>delay</i>	4.8	4.0	4.9
CEO deemed incompetent by trustee (dummy)	<i>inept</i>	0.32	-	-
Debt recovery rate as a fraction of face value	<i>recovery</i>	0.35	0.33	0.21
<b>D: Industry characteristics</b>				
Industry distress <sup>10</sup>	<i>distress</i>	0.42	0.38	0.16

<sup>1</sup>The firm characteristics are from the financial statement last filed prior to bankruptcy filing, dated back on average 17.5 months (median 16.5 months). The exception is the variable *secured*, which is from the bankruptcy file.

<sup>2</sup>Operating profitability is EBITDA divided by total sales.

<sup>3</sup>The firm's operating profitability less the contemporaneous median operating profitability for all Swedish firms with 20 employees or more, and the same 4-digit industry code as the sample firm.

<sup>4</sup>Book value of total debt divided by the book value of total assets.

<sup>5</sup>EBITDA plus interest income divided by interest expense.

<sup>6</sup>Fraction of CEOs in office two years prior to filing who are still in office at the time of bankruptcy filing.

<sup>7</sup>CEO equity ownership includes ownership of spouses.

<sup>8</sup>Net income before tax two years prior to filings, as reported in the CEO's individual tax return.

<sup>9</sup>The delay is based on the trustee's estimate of when the firm became insolvent.

<sup>10</sup>Industry distress is the fraction of all Swedish firms with at least 20 employees and the same 4-digit SIC code as the sample firm that either reports an interest coverage ratio of less than one in the year of filing, or files for bankruptcy during the next calendar year.

**Table 2**

**Determinants of the CEO rehiring probability in the bankruptcy auction.**

The table shows the coefficient estimates in the probit regressions for the probability  $\alpha$  that the buyer in the auction rehires the incumbent CEO. The probability  $\alpha$  is modeled as a function of the two factors *control* and *quality*, as well as the control variables *age* and *distress*:

$$\alpha = f(\text{control}, \text{quality}, \text{age}, \text{distress}).$$

The factor *control* is a proxy for managerial private benefits of control, and the factor *quality* measures CEO quality, defined using the following CEO- and firm characteristics:

$$\text{control} \equiv \text{ownership} + \text{tenure} - \text{secured} - n(\text{size})$$

$$\text{quality} \equiv \text{sqrt}(\text{recovery}) + \text{profmarg} - \text{inept} - \text{sqrt}(\text{delay})/\sigma.$$

The characteristics for the factor *control* are defined as follows: *ownership* is percent CEO equity holding, *tenure* is a binary variable indicating that the CEO's tenure with the firm exceeds two years, *secured* is the proportion of total debt that is secured, and  $n(\text{size})$  is the logarithm of the book value of asset standardized by subtracting its mean and dividing by its standard deviation. The characteristics for the factor *quality* are defined as follows:  $\text{sqrt}(\text{recovery})$  is the square root of the creditor recovery rate, *profmarg* is the firm's industry-adjusted operating profitability, *inept* is a binary variable indicating that the bankruptcy trustee classified the CEO as "incompetent", and  $\text{sqrt}(\text{delay})/\sigma$  is the square root of *delay* divided by its standard deviation, where *delay* is the number of months from the trustee's estimate of the actual insolvency date to the firm's filing date. Moreover, *saleback* and *external* are binary variables indicating that the auctioned firm is sold as a going concern to the old owner, and to a company outsider, respectively. The binary variable *piecemeal* indicates that the assets of the bankrupt firm are sold piecemeally in the auction. Finally, the variable *age* is the CEO's age at filing, and *distress* is the degree of industry-wide distress (see Table 1 for details). Sample: 150 privately held Swedish firms filing for bankruptcy during 1988-1991 (p-values are in parentheses).

Explanatory variables	Going concern sales		All filings	
	model 1	model 2	model 1	model 2
Constant	-0.04 (0.966)	0.68 (0.546)	-0.09 (0.914)	0.16 (0.870)
<b>CEO control benefits</b>				
control	0.31 (0.015)	-	0.25 (0.022)	-
control*saleback	-	0.55 (0.000)	-	0.67 (0.000)
control*external	-	-0.14 (0.543)	-	-0.01 (0.963)
control*piecemeal	-	-	-	-0.82 (0.022)
<b>CEO reputation</b>				
quality	0.48 (0.018)	-	0.43 (0.013)	-
quality*saleback	-	0.22 (0.349)	-	0.14 (0.550)
quality*external	-	1.42 (0.011)	-	1.46 (0.012)
quality*piecemeal	-	-	-	1.33 (0.126)
age	0.01 (0.581)	-0.00 (0.936)	0.01 (0.628)	0.01 (0.963)
<b>Industry control</b>				
distress	-1.39 (0.066)	-1.79 (0.031)	-1.60 (0.015)	-2.02 (0.009)
Sample size	112	111	150	149
rehired=1	56	56	56	56
rehired=0	56	55	94	93
Pseudo R-square	0.08	0.21	0.08	0.30
Chi-square	12.7 (0.013)	32.9 (0.000)	15.2 (0.004)	59.2 (0.000)



**Table 3**

**Determinants of the CEO income loss around auction bankruptcy filing.**

The table reports the OLS coefficient estimates in cross-sectional regressions of the CEO income loss  $\gamma = \log(c_2/c_3)$ , where  $c_t$  is the CEO's income before tax in year  $t$  relative to the filing year ( $t=0$ ). The income loss  $\gamma$  is modeled as a function of the two factors *control* and *quality*, as well as the control variables *age* and *distress*:

$$\gamma = f(\text{control}, \text{quality}, \text{age}, \text{distress}).$$

The factor *control* is a proxy for managerial private benefits of control, and the factor *quality* measures CEO quality, defined using the following CEO- and firm characteristics:

$$\text{control} \equiv \text{ownership} + \text{tenure} - \text{secured} - n(\text{size})$$

$$\text{quality} \equiv \text{sqrt}(\text{recovery}) + \text{profmarg} - \text{inept} - \text{sqrt}(\text{delay})/\sigma.$$

The characteristics for the factor *control* are defined as follows: *ownership* is percent CEO equity holding, *tenure* is a binary variable indicating that the CEO's tenure with the firm exceeds two years, *secured* is the proportion of total debt that is secured, and  $n(\text{size})$  is the logarithm of the book value of asset standardized by subtracting its mean and dividing by its standard deviation. The characteristics for the factor *quality* are defined as follows:  $\text{sqrt}(\text{recovery})$  is the square root of the creditor recovery rate, *profmarg* is the firm's industry-adjusted operating profitability, *inept* is a binary variable indicating that the bankruptcy trustee classified the CEO as "incompetent", and  $\text{sqrt}(\text{delay})/\sigma$  is the square root of *delay* divided by its standard deviation, where *delay* is the number of months from the trustee's estimate of the actual insolvency date to the firm's filing date. Moreover, *saleback* and *external* are binary variables indicating that the auctioned firm is sold as a going concern to the old owner, and to a company outsider, respectively. The binary variable *piecemeal* indicates that the assets of the bankrupt firm are sold piecemeally in the auction. Finally, the variable *age* is the CEO's age at filing, and *distress* is the degree of industry-wide distress (see Table 1 for details). Sample: 114 privately held Swedish firms filing for bankruptcy 1990-1991 (p-values are in parentheses).

Explanatory variables	Going concern sales		All filings	
	model 1	model 2	model 1	model 2
constant	-1.36 (0.164)	-1.23 (0.215)	-1.09 (0.200)	-1.00 (0.200)
<b>CEO control benefits</b>				
control	0.23 (0.079)	-	0.12 (0.297)	-
control*saleback	-	0.09 (0.572)	-	0.03 (0.823)
control*external	-	0.46 (0.019)	-	0.47 (0.008)
control*piecemeal	-	-	-	-0.28 (0.144)
<b>CEO reputation</b>				
quality	0.16 (0.457)	-	0.06 (0.354)	-
quality*saleback	-	0.19 (0.467)	-	0.19 (0.416)
quality*external	-	0.02 (0.951)	-	0.05 (0.889)
quality*piecemeal	-	-	-	0.18 (0.616)
age	0.02 (0.319)	0.02 (0.426)	0.02 (0.354)	0.01 (0.448)
<b>Industry control</b>				
distress	0.59 (0.486)	0.82 (0.348)	0.60 (0.381)	0.93 (0.160)
Sample size	85	83	114	111
Adjusted R-square	0.02	0.04	-0.01	0.06
F-value	1.38 (0.249)	1.54 (0.177)	0.75 (0.600)	1.84 (0.077)

**Table 4****Post-bankruptcy financial characteristics for firms sold as going concerns, 1988-1991.**

The table shows post-bankruptcy performance, growth and leverage for 115 private Swedish firms auctioned in bankruptcy as going concerns, 1988-1991.

Event year $t^1$	Sample size	Firm value		Industry-adjusted value	
		Median	Fraction <0	Median	Fraction <0
A: Operating profitability (EBITDA/sales)					
1	111	0.054	0.23	0.005	0.49
2	103	0.043	0.21	- 0.007	0.54
3	88	0.064	0.16	- 0.003	0.52
4	85	0.079	0.15	0.001	0.47
5	45	0.096	0.11	0.020 <sup>b</sup>	0.37
B: Growth in sales					
[1, 2]	104	0.015	0.48	0.027	0.48
[2,3]	88	0.076	0.32	0.029 <sup>b</sup>	0.45
[3,4]	81	0.111	0.27	0.060	0.43
[4,5]	45	0.040	0.42	-0.030	0.59
C: Growth in total book assets					
[1,2]	103	0.022	0.48	0.011	0.47
[2,3]	89	0.029	0.43	-0.002	0.51
[3,4]	83	0.077	0.36	0.010	0.48
[4,5]	46	0.054	0.46	-0.023	0.52
D: Capital expenditure/assets <sup>3</sup>					
[1,2]	99	0.000	0.47	0.008	0.48
[2,3]	84	0.000	0.34	0.020	0.48
[3,4]	76	0.000	0.43	-0.036	0.59
[4,5]	40	0.000	0.35	-0.045 <sup>a</sup>	0.69
E: Total book debt-to-assets ratio					
1	111	0.902	-	0.105 <sup>aa</sup>	0.28
2	105	0.895	-	0.088 <sup>aa</sup>	0.27
3	90	0.877	-	0.094 <sup>aa</sup>	0.32
4	87	0.832	-	0.093 <sup>aa</sup>	0.36
5	46	0.760	-	-0.001	0.50

<sup>1</sup>Year  $t=1$  denotes the first year of operations following the bankruptcy auction.

<sup>2</sup>Industry-adjusted median is the median difference between the firm and the median value for its industry rivals, where industry rivals are all Swedish firms with 20 employees or more, and the same 4-digit SIC code as the sample firm. The probability of rejecting the null-hypothesis that the industry-adjusted value equals zero at the 1%, 5% and 10% significance level is denoted <sup>aa</sup>, <sup>a</sup>, and <sup>b</sup>, respectively, using a two-tailed Wilcoxon signed-rank test.

<sup>3</sup>Capital expenditure is the difference in book value of property, plant and equipment from last year plus this year's depreciation.

**Table 5****Determinants of the post-bankruptcy industry-adjusted operating profitability following auction bankruptcy.**

The table shows coefficient estimates for OLS regressions of the post-bankruptcy industry-adjusted operating profitability  $\pi_t$  cumulated over years  $t=1$  and  $t=2$ , where year 0 is the year of the bankruptcy auction.  $\pi_t$  is defined as the difference between the firm's operating profitability (EBITDA/sales) and the contemporaneous median operating profitability for all Swedish firms with at least 20 employees and the same 4-digit SIC code. The cumulative operating profitability is modeled as a function of the two factors *control* and *quality*, as well as the control variables *distress* and *merger*:

$$\sum_{t=1}^T \pi_t = f(\text{control}, \text{quality}, \text{distress}, \text{merger}), \quad t=1,2$$

The factor *control* is a proxy for managerial private benefits of control, and the factor *quality* measures CEO quality, defined using the following CEO- and firm characteristics:

$$\text{control} \equiv \text{ownership} + \text{tenure} - \text{secured} - n(\text{size})$$

$$\text{quality} \equiv \text{sqrt}(\text{recovery}) + \text{profmarg} - \text{inept} - \text{sqrt}(\text{delay})/\sigma.$$

The characteristics for the factor *control* are defined as follows: *ownership* is percent CEO equity holding, *tenure* is a binary variable indicating that the CEO's tenure with the firm exceeds two years, *secured* is the proportion of total debt that is secured, and  $n(\text{size})$  is the logarithm of the book value of asset standardized by subtracting its mean and dividing by its standard deviation. The characteristics for the factor *quality* are defined as follows:  $\text{sqrt}(\text{recovery})$  is the square root of the creditor recovery rate, *profmarg* is the firm's industry-adjusted operating profitability, *inept* is a binary variable indicating that the bankruptcy trustee classified the CEO as "incompetent", and  $\text{sqrt}(\text{delay})/\sigma$  is the square root of *delay* divided by its standard deviation, where *delay* is the number of months from the trustee's estimate of the al insolvency date to the firm's filing date. Moreover, *saleback* and *external* are binary variables indicating that the auctioned firm is sold as a going concern to the old owner, and to a company outsider, respectively. The binary variable *piecemeal* indicates that the assets of the bankrupt firm are sold piecemeally in the auction. Finally, *distress* is the degree of industry-wide distress (see Table 1 for details), and the binary variable *merger* indicates that the buyer in the auction merged the bankrupt firm's assets into another going concern (and not into an empty corporate shell). Sample: 66 privately held Swedish firms auctioned as a going concern, 1988-1991 (p-values are in parentheses).

Explanatory variables:	Dependent variable: Cumulative operating profitability			
	$e^{\pi_1}$		$e^{\pi_1+\pi_2}$	
	model 1	model 2	model 1	model 2
constant	1.04 (0.000)	1.04 (0.000)	1.07 (0.000)	1.06 (0.000)
<b>CEO control benefits</b>				
control	-0.01 (0.405)	-	-0.05 (0.163)	-
control*saleback	-	-0.01 (0.585)	-	-0.03 (0.467)
control*external	-	-0.02 (0.466)	-	-0.08 (0.135)
<b>CEO reputation</b>				
quality	0.06 (0.050)	-	0.08 (0.182)	-
quality*saleback	-	0.08 (0.043)	-	0.09 (0.277)
quality*external	-	0.03 (0.587)	-	0.03 (0.784)
<b>Industry control</b>				
distress	-0.07 (0.534)	-0.06 (0.565)	-0.09 (0.699)	-0.07 (0.752)
merger	0.05 (0.121)	0.05 (0.167)	0.19 (0.014)	0.21 (0.014)
Sample size	66	66	60	60
Adjusted R-square	0.06	0.04	0.10	0.07
F-value	2.11 (0.090)	1.51 (0.192)	2.66 (0.042)	1.82 (0.135)

**Table 6**  
**Determinants of the bankruptcy refiling probability.**

The table shows the coefficient estimates for probit regressions of the probability  $\delta_t$  that the firm refiles for bankruptcy within  $t$  years of the original bankruptcy auction, where  $t=[1,2,3]$ . The refiling probability  $\delta_t$  is modeled as a function of the two factors *control* and *quality*, as well as the control variables *distress* and *merger*:

$$\delta_t = f(\text{control}, \text{quality}, \text{distress}, \text{merger}), \quad t=1,2,3$$

The factor *control* is a proxy for managerial private benefits of control, and the factor *quality* measures CEO quality, defined using the following CEO- and firm characteristics:

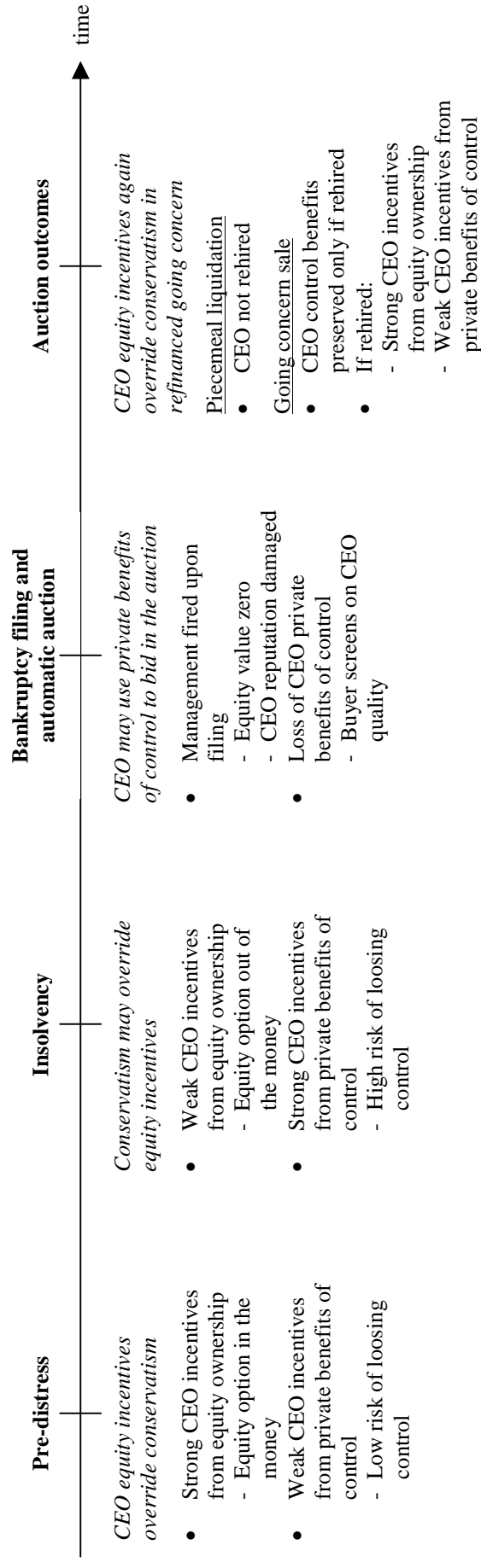
$$\text{control} \equiv \text{ownership} + \text{tenure} - \text{secured} - n(\text{size})$$

$$\text{quality} \equiv \text{sqrt}(\text{recovery}) + \text{profmarg} - \text{inept} - \text{sqrt}(\text{delay})/\sigma.$$

The characteristics for the factor *control* are defined as follows: *ownership* is percent CEO equity holding, *tenure* is a binary variable indicating that the CEO's tenure with the firm exceeds two years, *secured* is the proportion of total debt that is secured, and  $n(\text{size})$  is the logarithm of the book value of asset standardized by subtracting its mean and dividing by its standard deviation. The characteristics for the factor *quality* are defined as follows:  $\text{sqrt}(\text{recovery})$  is the square root of the creditor recovery rate, *profmarg* is the firm's industry-adjusted operating profitability, *inept* is a binary variable indicating that the bankruptcy trustee classified the CEO as "incompetent", and  $\text{sqrt}(\text{delay})/\sigma$  is the square root of *delay* divided by its standard deviation, where *delay* is the number of months from the trustee's estimate of the al insolvency date to the firm's filing date. Moreover, *saleback* and *external* are binary variables indicating that the auctioned firm is sold as a going concern to the old owner, and to a company outsider, respectively. The binary variable *piecemeal* indicates that the assets of the bankrupt firm are sold piecemeally in the auction. Finally, *distress* is the degree of industry-wide distress (see Table 1 for details), and the binary variable *merger* indicates that the buyer in the auction merged the bankrupt firm's assets into another going concern (and not into an empty corporate shell). Sample: 94 privately held Swedish firms auctioned as a going concern, 1988-1991 (p-values are in parentheses).

Explanatory variables	Dependent variable: bankruptcy refiling through year $t=1,2,3$					
	Year 1		Year 2		Year 3	
	model 1	model 2	model 1	model 2	model 1	model 2
constant	-1.83 (0.003)	-2.03 (0.003)	-1.57 (0.001)	-1.73 (0.000)	-1.36 (0.001)	-1.52 (0.001)
<b>CEO control benefits</b>						
control	0.11 (0.585)	-	-0.26 (0.074)	-	-0.20 (0.145)	-
control*saleback	-	0.22 (0.297)	-	-0.15 (0.347)	-	-0.09 (0.546)
control*external	-	-0.37 (0.442)	-	-0.66 (0.026)	-	-0.59 (0.031)
<b>CEO reputation</b>						
quality	-0.52 (0.105)	-	-0.46 (0.061)	-	-0.51 (0.027)	-
quality*saleback	-	-0.83 (0.032)	-	-0.63 (0.028)	-	-0.66 (0.016)
quality*external	-	0.22 (0.832)	-	-0.39 (0.472)	-	-0.61 (0.219)
<b>Industry control</b>						
distress	0.37 (0.753)	0.36 (0.773)	2.09 (0.019)	2.23 (0.017)	2.03 (0.018)	2.20 (0.014)
merger	0.50 (0.913)	0.46 (0.386)	0.18 (0.602)	0.45 (0.241)	0.19 (0.562)	0.43 (0.231)
Sample size	94	94	94	94	94	94
refiling=1	8	8	25	25	35	32
refiling=0	86	86	69	69	59	62
Pseudo R-square	0.06	0.15	0.09	0.13	0.09	0.13
Chi-square	3.54 (0.472)	8.15 (0.227)	10.2 (0.037)	14.15 (0.025)	11.8 (0.026)	15.6 (0.016)

**Figure 1: CEO incentives at various stages of financial distress**



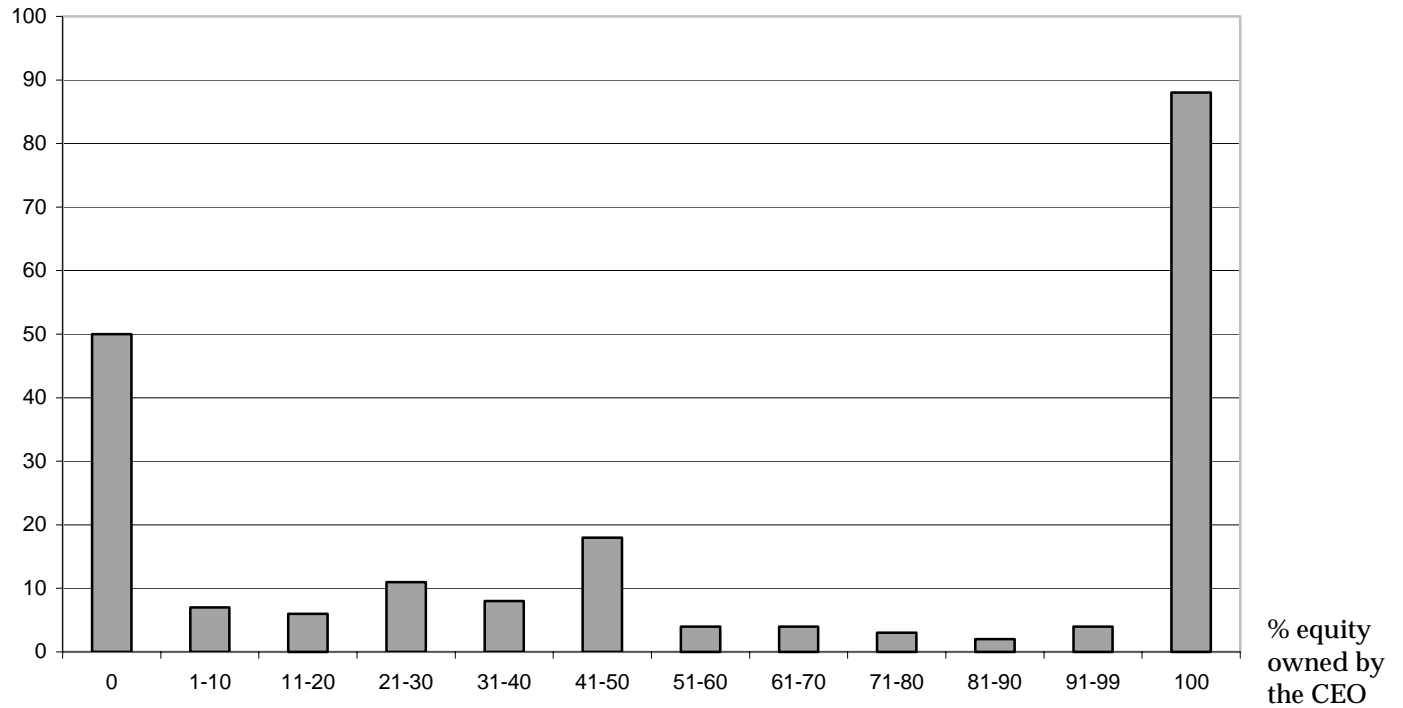


**Figure 2**

**Distribution of percentage CEO ownership in the firms filing for auction bankruptcy**

Frequency distribution of the percentage CEO equity ownership in 205 privately held Swedish firms filing for bankruptcy, 1988-1991.

Number of cases



**Figure 3**

**Evolution of a median income index for CEOs of bankrupt and non-bankrupt firms**

The figure plots the annual values of  $\hat{c}_t = \hat{c}_{t-1} \Delta c_t^m$ , where  $\Delta c_t^m$  is the median rate of change in CEO taxable income  $\Delta c_t = (c_t - c_{t-1}) / c_{t-1}$ , and  $\hat{c}_{-3} \equiv 100$ . The lower index represents CEOs of firms filing for bankruptcy, while the upper index represents CEOs of non-bankrupt firms matched on 4-digit industry and asset size. Total sample of 258 privately held Swedish firms filing for bankruptcy, 1988-1991.

